

ABSTRACT

A copper damascene structure formed by direct patterning of a low-dielectric constant material is disclosed. The copper damascene structure includes a tungsten nitride barrier layer formed by atomic layer deposition using sequential deposition reactions. Copper is selectively deposited by a CVD process and/or by an electroless deposition technique.

1. *Pharmaceuticals* (1997) 10, 1-10.
 2. *Pharmaceuticals* (1998) 11, 1-10.
 3. *Pharmaceuticals* (1999) 12, 1-10.
 4. *Pharmaceuticals* (2000) 13, 1-10.
 5. *Pharmaceuticals* (2001) 14, 1-10.
 6. *Pharmaceuticals* (2002) 15, 1-10.
 7. *Pharmaceuticals* (2003) 16, 1-10.
 8. *Pharmaceuticals* (2004) 17, 1-10.
 9. *Pharmaceuticals* (2005) 18, 1-10.
 10. *Pharmaceuticals* (2006) 19, 1-10.
 11. *Pharmaceuticals* (2007) 20, 1-10.
 12. *Pharmaceuticals* (2008) 21, 1-10.
 13. *Pharmaceuticals* (2009) 22, 1-10.
 14. *Pharmaceuticals* (2010) 23, 1-10.
 15. *Pharmaceuticals* (2011) 24, 1-10.
 16. *Pharmaceuticals* (2012) 25, 1-10.
 17. *Pharmaceuticals* (2013) 26, 1-10.
 18. *Pharmaceuticals* (2014) 27, 1-10.
 19. *Pharmaceuticals* (2015) 28, 1-10.
 20. *Pharmaceuticals* (2016) 29, 1-10.
 21. *Pharmaceuticals* (2017) 30, 1-10.
 22. *Pharmaceuticals* (2018) 31, 1-10.
 23. *Pharmaceuticals* (2019) 32, 1-10.
 24. *Pharmaceuticals* (2020) 33, 1-10.
 25. *Pharmaceuticals* (2021) 34, 1-10.
 26. *Pharmaceuticals* (2022) 35, 1-10.
 27. *Pharmaceuticals* (2023) 36, 1-10.
 28. *Pharmaceuticals* (2024) 37, 1-10.
 29. *Pharmaceuticals* (2025) 38, 1-10.
 30. *Pharmaceuticals* (2026) 39, 1-10.
 31. *Pharmaceuticals* (2027) 40, 1-10.
 32. *Pharmaceuticals* (2028) 41, 1-10.
 33. *Pharmaceuticals* (2029) 42, 1-10.
 34. *Pharmaceuticals* (2030) 43, 1-10.
 35. *Pharmaceuticals* (2031) 44, 1-10.
 36. *Pharmaceuticals* (2032) 45, 1-10.
 37. *Pharmaceuticals* (2033) 46, 1-10.
 38. *Pharmaceuticals* (2034) 47, 1-10.
 39. *Pharmaceuticals* (2035) 48, 1-10.
 40. *Pharmaceuticals* (2036) 49, 1-10.
 41. *Pharmaceuticals* (2037) 50, 1-10.
 42. *Pharmaceuticals* (2038) 51, 1-10.
 43. *Pharmaceuticals* (2039) 52, 1-10.
 44. *Pharmaceuticals* (2040) 53, 1-10.
 45. *Pharmaceuticals* (2041) 54, 1-10.
 46. *Pharmaceuticals* (2042) 55, 1-10.
 47. *Pharmaceuticals* (2043) 56, 1-10.
 48. *Pharmaceuticals* (2044) 57, 1-10.
 49. *Pharmaceuticals* (2045) 58, 1-10.
 50. *Pharmaceuticals* (2046) 59, 1-10.
 51. *Pharmaceuticals* (2047) 60, 1-10.
 52. *Pharmaceuticals* (2048) 61, 1-10.
 53. *Pharmaceuticals* (2049) 62, 1-10.
 54. *Pharmaceuticals* (2050) 63, 1-10.
 55. *Pharmaceuticals* (2051) 64, 1-10.
 56. *Pharmaceuticals* (2052) 65, 1-10.
 57. *Pharmaceuticals* (2053) 66, 1-10.
 58. *Pharmaceuticals* (2054) 67, 1-10.
 59. *Pharmaceuticals* (2055) 68, 1-10.
 60. *Pharmaceuticals* (2056) 69, 1-10.
 61. *Pharmaceuticals* (2057) 70, 1-10.
 62. *Pharmaceuticals* (2058) 71, 1-10.
 63. *Pharmaceuticals* (2059) 72, 1-10.
 64. *Pharmaceuticals* (2060) 73, 1-10.
 65. *Pharmaceuticals* (2061) 74, 1-10.
 66. *Pharmaceuticals* (2062) 75, 1-10.
 67. *Pharmaceuticals* (2063) 76, 1-10.
 68. *Pharmaceuticals* (2064) 77, 1-10.
 69. *Pharmaceuticals* (2065) 78, 1-10.
 70. *Pharmaceuticals* (2066) 79, 1-10.
 71. *Pharmaceuticals* (2067) 80, 1-10.
 72. *Pharmaceuticals* (2068) 81, 1-10.
 73. *Pharmaceuticals* (2069) 82, 1-10.
 74. *Pharmaceuticals* (2070) 83, 1-10.
 75. *Pharmaceuticals* (2071) 84, 1-10.
 76. *Pharmaceuticals* (2072) 85, 1-10.
 77. *Pharmaceuticals* (2073) 86, 1-10.
 78. *Pharmaceuticals* (2074) 87, 1-10.
 79. *Pharmaceuticals* (2075) 88, 1-10.
 80. *Pharmaceuticals* (2076) 89, 1-10.
 81. *Pharmaceuticals* (2077) 90, 1-10.
 82. *Pharmaceuticals* (2078) 91, 1-10.
 83. *Pharmaceuticals* (2079) 92, 1-10.
 84. *Pharmaceuticals* (2080) 93, 1-10.
 85. *Pharmaceuticals* (2081) 94, 1-10.
 86. *Pharmaceuticals* (2082) 95, 1-10.
 87. *Pharmaceuticals* (2083) 96, 1-10.
 88. *Pharmaceuticals* (2084) 97, 1-10.
 89. *Pharmaceuticals* (2085) 98, 1-10.
 90. *Pharmaceuticals* (2086) 99, 1-10.
 91. *Pharmaceuticals* (2087) 100, 1-10.
 92. *Pharmaceuticals* (2088) 101, 1-10.
 93. *Pharmaceuticals* (2089) 102, 1-10.
 94. *Pharmaceuticals* (2090) 103, 1-10.
 95. *Pharmaceuticals* (2091) 104, 1-10.
 96. *Pharmaceuticals* (2092) 105, 1-10.
 97. *Pharmaceuticals* (2093) 106, 1-10.
 98. *Pharmaceuticals* (2094) 107, 1-10.
 99. *Pharmaceuticals* (2095) 108, 1-10.
 100. *Pharmaceuticals* (2096) 109, 1-10.
 101. *Pharmaceuticals* (2097) 110, 1-10.
 102. *Pharmaceuticals* (2098) 111, 1-10.
 103. *Pharmaceuticals* (2099) 112, 1-10.
 104. *Pharmaceuticals* (2100) 113, 1-10.
 105. *Pharmaceuticals* (2101) 114, 1-10.
 106. *Pharmaceuticals* (2102) 115, 1-10.
 107. *Pharmaceuticals* (2103) 116, 1-10.
 108. *Pharmaceuticals* (2104) 117, 1-10.
 109. *Pharmaceuticals* (2105) 118, 1-10.
 110. *Pharmaceuticals* (2106) 119, 1-10.
 111. *Pharmaceuticals* (2107) 120, 1-10.
 112. *Pharmaceuticals* (2108) 121, 1-10.
 113. *Pharmaceuticals* (2109) 122, 1-10.
 114. *Pharmaceuticals* (2110) 123, 1-10.
 115. *Pharmaceuticals* (2111) 124, 1-10.
 116. *Pharmaceuticals* (2112) 125, 1-10.
 117. *Pharmaceuticals* (2113) 126, 1-10.
 118. *Pharmaceuticals* (2114) 127, 1-10.
 119. *Pharmaceuticals* (2115) 128, 1-10.
 120. <